PRODUCT CATALOG

ELECTRONIC MULTI METER

QLC-110/ QLC-110L

ELECTRONIC MULTI METER

QLC-110/ QLC-110L

OUTLINE

* Most suitable for measuring the monitor of incoming circuit from low-voltage circuit to high-voltage circuit.
* Centralized monitoring in line with system is possible by adding analog output and communication output .
* For oversea sales, the lineup of the product make with phase display sign R-Y-B-W (Hard model C), U-V-W-N (Hard model D) is carried out.

QLC-110/ 110L
110*110*121mm (600g)

FEATURES

* This is a change measurement for V(RS, ST, TR)/ A(R, S, T)/ W/ var/ cosϕ/ Hz/ Wh/ varh in three phase circuit use.
* Analog output 3 circuits or analog output 2 circuits + watthour or var-hour pulse output 1 circuit can be extracted.
* Communication output or communication output + watthour or var-hour pulse output 1 circuit can be extracted.
* Integrated value of Wh/ varh can be expanded displayed until 3rd digit after the decimal point.
* Analog output is equipped with minimum limit.
* Var/ cosϕ can be changed to power flow measurement. (output 2 quadrant)

TYPE AND SPECIFICATION CODE

Specification Code

Type — (2) (3) (4) (5) (6) — (7) (8) **0**

QLC-110
No backlight
QLC-110L
With Backlight

(2) Hard model

B	R-S-T-N Display
C	R-Y-B-W Display
D	U-V-W-N Display
	* Hard model C is applied to QLC-110L only

(3) Input circuit

1	1Φ 2W
2	1Φ 3W
3	3Φ 3W
4	3Φ 4W
Z	Except above

(4) Input range

1Φ 2W, 3Φ 3W		1Φ 3W	
1	150V, 5A	1	150-300V, 5A
2	150V, 1A	2	150-300V, 1A
3	300V,5A	5	5A
4	300V, 1A	6	1A
5	5A	9	150-300V
6	1A	Z	Except above
7	5A (3Φ 3W 3CT)	3Φ 4W	
8	1A (3Φ 3W 3CT)	1	150V/ √3, 5A
9	150V	2	150V/ √3, 1A
		3	300V/ √3, 5A
A	300V	4	300V/ √3, 1A
P	150V, 5A (3Φ 3W 2VT 3CT)	5	5A
Q	150V, 1A (3Φ3 W 2VT 3CT)	6	1A
R	300V, 5A (3Φ 3W 2VT 3CT)	9	150V/ √3
S	300V, 1A (3Φ 3W 2VT 3CT)	A	300V/ √3
Z	Except above	Z	Except above

(5) Auxiliary power

1	AC85 - 253V DC80 - 143V For both use
2	DC20-56V
Z	Except above

(6) External operation input

0	None
1	Display change
Z	Except above

(7) Analog/ communication output

0	No analog/ communication output
1	4-20mA
2	0-1mA
3	1-5V
4	0-5V
5	0-10V
A	Protocol A (RS-485)
Z	Analog output: Except above

(8) Pulse output

0	None
1	1 output a contact (photo MOS relay)
Z	Except above

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Equipment Specification

Connecting System	Input, Auxiliary Power, M4 Screw
	Output, Display Change Input, M3 Screw
LCD Display	Main monitor: Character height 10mm 5 digits
	Sub-monitor (L): Character height 6mm 4 digits
	Sub-monitor (R): Character height 6mm 4 digits
	Bar graph: 30 dots
Display Renewal Time	Approx. 1 sec. (Bar graph: Approx. 0.25sec.)
Measurement	Voltage, Current, Power, Reactive Power, Power Factor, Frequency, Watt-hour, Var-hour Display Change
Operating Temperature/ Humidity Range	-10 to +55°C, 30 to 85%RH (No condensation)
Storage Temperature Range	-25 to +70°C
Material	ABS (V-0) Exterior color: Black (Munsell N1.5)
Mass	600g
Size	Refer to outline drawing (Compatible with wide angle indicating instrument)

Input Specification

Input Consumption VA	Voltage circuit rated value: 110V (FS: 150V)		0.25VA or less
	Voltage circuit rated value: 220V (FS: 300V)		0.5VA or less
	Current circuit: 5A, 1A		0.1VA or less
External Operation Input (Display Change)	Input Specification	Indication change input: Indication change is possible by adding a voltage signal, function same as a DISPLAY switch. Reset input: Reset of the maximum value (minimum value) and an warning output is possible by adding a voltage signal. Rating same as auxiliar power , The smallest pulse width 300ms continual applicable.	
	Power Consumption	AC, DC100/ 110V	0.4VA, 0.4W
		AC200V/ 220V	1.4VA
		DC24V	0.3W
		DC48V	1.2W
	Contact Capacity	AC, DC100/ 110V	3mA
		AC200V/ 220V	6mA
		DC24V	10mA
		DC48V	20mA

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Output Specification

* Analog output: 3 circuits (with pulse output: 2 circuits)	
Rated value	4-20mA: 55Ω or less, 0-1mA: 10Ω or less, 1-5V: 600Ω or more, 0-5V: 600Ω or more, 0-10V: 2kΩ or more Specify identical value for each circuit. Non-insulation (minus common) between analog outputs
Ripple output	1% p-p or less against output span
Response time	1sec. or less. Time to be within ±1 % of final constant value
*** Pulse output: Output element: watt-hour or var-hour**	
Output system	Photo MOS/ FET relay 1a contact
Contact capacity	AC, DC125V 70mA (Resistance load, Inductive load)
Pulse width	250ms±10%
	When the output pulse cycle at the rated electric power becomes the speed of 2 pulses or more per second by setting voltage measurement range, current measurement range, and output pulse unite, the output pulse width becomes 100-130ms. Output pulse cycle = Rated electric power[kW]/ output pulse unite[kWh/ pulse]/ 3600[sec.]
	Refer to p.11 for setting output pulse unit.
Output ON resistance	10Ω or less
*** Communication output**	
Communication system	RS-485 Half-duplex 2-wire system Asynchronous communication
Transmission speed	1200/ 2400/ 4800/ 9600 bps
Transmission code	NRZ
Start bit	1 bit
Data bits	7/8 bits
Parity	None/ even/ odd
Stop bit	1/2 bit
Cable length	1000m (Fully extended)
Address	1-99
No .of connectable units	Connectable up to 31 units. Use repeater after 32nd unit (Connectable up to 99 units)
Transmission character	ASCII code

Auxiliary Power Specification

Power Consumption (With Backlight)	AC85-253V 50/60Hz	10VA
	DC80-143V	5W
	DC20-56V	6W
Power Consumption (No Backlight)	AC85-253V 50/60Hz	8VA
	DC80-143V	4W
	DC20-56V	5W
Rush Current (For Backlight & No Backlight both use)	AC110V	5.3A or less (Approx. 1.6ms)
	AC220V	10.5A or less (Approx. 1.6ms)
	DC110V	3.7A or less (Approx. 1.6ms)
	DC24V	5.0A or less (Approx. 2.0ms)
	DC48V	9.9A or less (Approx. 2.0ms)

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PERFORMANCE

Item	Measuring element	Measuring range/ Display specification	Allowance *(1)		Note
			Display	Output	
Approved standard		JIS C 1102-1,-2, -3, -4, -5, -7, JIS C 1111, JIS C 1216, JIS C 1263 performance conformity, EIA standard RS-485			
Measuring element	Voltage	AC150 - 750.0kV (24 range)	±1.0%	±0.5%	RS-ST-TR Line change *(2)
	Current	AC5.00A - 30.0kA (70 range)	±1.0%	±0.5%	R-S-T Phase change *(2)
	Power	480W - 1000MW Range selection Max. scale setting 40 - 115%	±1.0%	±0.5%	Range of analog output in indication and independence setting possibility *(3)
	Reactive power	LEAD, LAG 360var - 1000Mvar Range selection Max. scale setting 30 - 115%	±1.0%	±0.5%	Range of analog output in indication and independence setting possibility
	Power factor	LEAD 0.5 - 1 - LAG 0.5 OR LEAD 0 - 1 - LAG 0 Range selection	±2.0%	±2.0%	cosØ = 1 when input is under 20% of voltage range or being under 2% of current range (output equal to cosØ = 1)
	Frequency	45 - 55Hz OR 55 - 65Hz, 45 - 65Hz Range selection	±0.5%	±0.5%	0.0Hz when input is under 20% of voltage range (output lower limit value -1%)
	Watt-hour	Display: 5 columns integer, Multiplying factor: Integer of 10 times, enlargement indicatory possibility to 3 integer rank decimal point. Power integratied (receiving), Integrated value power failure guaranty.	Power factor 1 : ±2.0% Power factor 0.5 : ±2.5%		Normally the setting range of the watt-hour meter performance conformity and output pulse unit (kWh/ pulse) can refer to common specification at page 16.
	Var-hour	Display: 5 columns integer, Multiplying factor: Integer of 10 times, enlargement indicatory possibility to 3 integer rank decimal point. LAG reactive power integrated (receiving), Integrated value power failure guaranty	Power factor 0 : ±2.5% Power factor 0.87 : ±2.5%		Refer to common specification page 16 for setting range of output pulse unit (kvarh/ pulse)
Bar graph display		Bar graph display of main monitor element (except watt-hour, var-hour) Sub-monitoring elements can be displayed by setting.			
Bar graph display accuracy		±5% (% against span)			
Influence of temperature		23°C±10°C within allowance			
Indicatory renewal time		Approx. 1sec. (Bar graph: Approx. 0.25 sec.)			
Indicatory setting possible element	Main monitor	Voltage, current, power, reactive power, power factor, frequency, watt-hour, var-hour			
	Sub-monitor (L)	Voltage, current, power, reactive power, frequency			
	Sub-monitor (R)	Voltage, current, power, power factor, frequency			
	Bar graph	Voltage, current, power, reactive power, power factor, frequency			
Option		Analog output (2 circuits when with pulse output, 3 circuits with no with pulse output) OR communication output, pulse output, display change input			
Power failure guaranty		Setting value/ integrating value			
Analog output (option)	Output possible element	Three phase 3 wire	Voltage (RS-ST-TR), Current (R-S-T), Power, Reactive power, Power factor, Frequency		
		Three phase 4 wire	Voltage (RN-SN-TN-RS-ST-TR), Current (R-S-T), Power, Reactive power, Power factor, Frequency		
		Single phase	Voltage, Current, Power, Reactive power, Power factor, Frequency		
		Single phase 3 wire	Voltage (RN-TN-RT), Current (R-T-N), Power, Reactive power, Power factor, Frequency		

*(1) Due to the measurement system of the meter, the accuracy will decrease when output of the control of recycling, SCR phase control and PWM control invertor is measured directly.

*(2) Three phase 4 wire: Voltage display: RN-SN-TN-RS-ST-TR, Current display: R-S-T-N,
Bar graph full scale = Full scale value of line voltage, voltage balance type.
Single phase 3 wire: Voltage display: RN-TN-RT, Current display R-T-N, Full scale value of bar graph: 300V

*(3) Reverse power can be measured up to -15% of full scale by digital meter at bar graph 1/2 peak-peak setting.

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MEASURING RANGE

A) Voltage Measuring Range

150V	(110V)	15.00kV	(11kV/ 110V)
150.0V	(110V)	30.0kV	(22kV/ 110V)
300V	(220V, 220V/ 110V)	45.0kV	(33kV/ 110V)
300.0V	(220V, 220V/ 110V)	90.0kV	(66kV/ 110V)
600V	(440V/ 110V)	105.0kV	(77kV/ 110V) *(4)
1500V	(1100V/ 110V)	150.0kV	(110kV/ 110V)
3000V	(2200V/ 110V)	180.0kV	(132kV/ 110V)
3.00kV	(2200V/ 110V)	210.0kV	(154kV/ 110V)
4500V	(3300V/ 110V)	255.0kV	(187kV/ 110V) *(5)
4.50kV	(3300V/ 110V)	300.0kV	(220kV/ 110V)
9000V	(6600V/ 110V)	375.0kV	(275kV/ 110V) *(6)
9.00kV	(6600V/ 110V)	750.0kV	(550kV/ 110V)

*(4) Full scale in the bar graph becomes 120.0kV

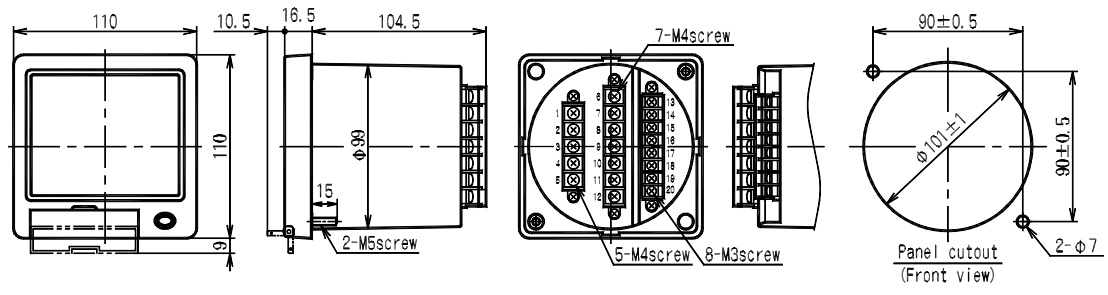
*(5) Full scale in the bar graph becomes 270.0kV

*(6) Full scale in the bar graph becomes 400.0kV

B) Current Measuring Range

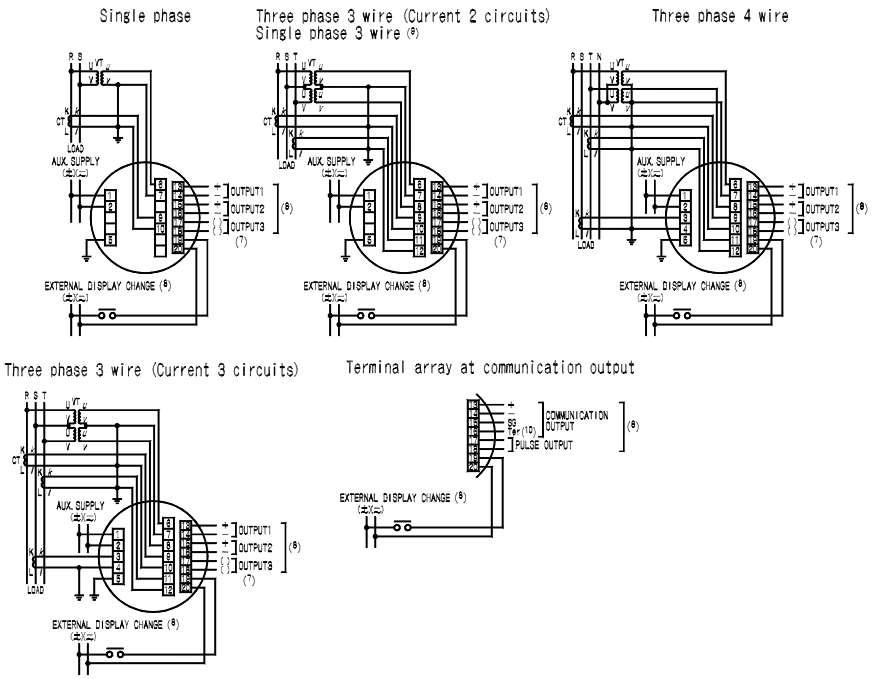
5.00A	25.00A	120A	750A	3000A	10.00kA
6.00A	25.0A	150.0A	800A	3.00kA	10.0kA
7.50A	30.00A	150A	1000A	4000A	12.00kA
8.00A	30.0A	200.0A	1.00kA	4.00kA	12.0kA
10.00A	40.0A	200A	1200A	5000A	15.00kA
10.0A	50.0A	250.0A	1.20kA	5.00kA	15.0kA
12.00A	60.0A	250A	1500A	6000A	20.00kA
12.0A	75.0A	300.0A	1.50kA	6.00kA	20.0kA
15.00A	80.0A	300A	2000A	7500A	30.00kA
15.0A	100.0A	400A	2.00kA	7.50kA	30.0kA
20.00A	100A	500A	2500A	8000A	
20.0A	120.0A	600A	2.50kA	8.00kA	

Outline Drawing (unit: mm)



Connection Diagram

Voltage/ Current Input (11)



Note:

*(7) Output 1, output 2 are exclusive use for analog output and output 3 becomes analog output or pulse output. [In case output 3 is anolog output, output 3 will becomes 17(+), 18(-).] Pulse output is watt hour and var hour output of output 3.

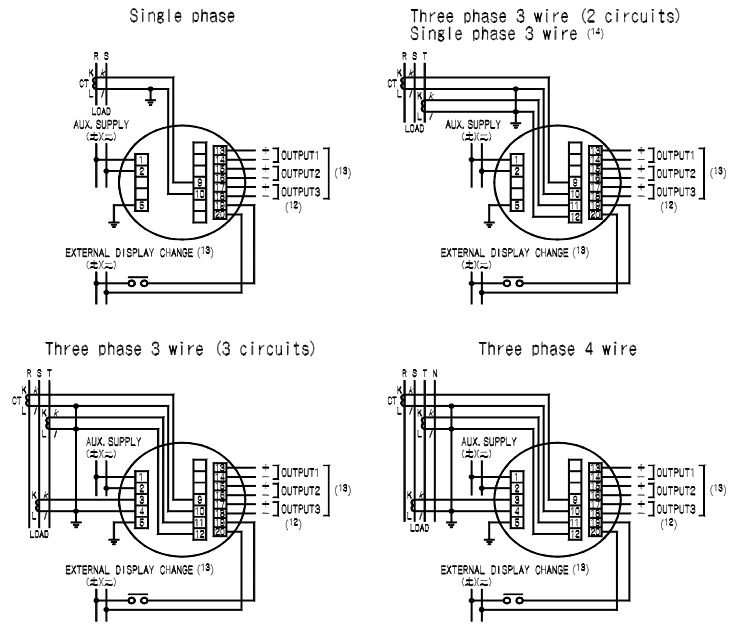
*(8) External display change becomes each option for output 1, output 2, output 3, communication output, pulse output. Pulse output is watt hour and Var hour output of output.

*(9) In case of single phase 3 wire: S-phase No.7 becomes N-phase.

*(10) Terminal resistance is connected interior by short circuit No.14 and No.16.

*(11) In case of low voltage circuit, the second side grounding of VT and CT is unnecessary.
Also when used in 110V or 220V direct, VT is unnecessary.

Current Input (15)



Note:

*(12) Output 1, output 2, output 3 is analog output

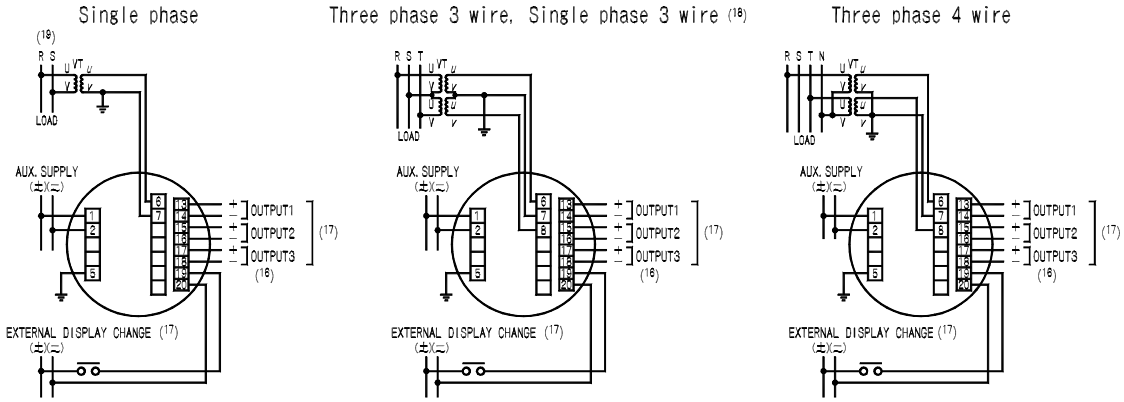
*(13) External display change becomes of each option for output 1, output 2, and output 3.

*(14) In case of single phase 3 wire, S phase becomes N phase.

*(15) In case of low voltage circuit, the second side grounding of CT is unnecessary.

Connection Diagram

Voltage Input (20)



Note:

* (16) Output 1, output 2, output 3 is analog output.
* (17) External display change becomes of each option for output 1, output 2, output 3.
* (18) In case of single phase 3 wire, S phase No.7 becomes N phase.
* (19) There is no line display on display screen.
* (20) In case of low voltage circuit, the second side grounding of VT is unnecessary.
  Also when used in 110V or 200V direct, VT is unnecessary.

ITEM TO SPECIFY ON PURCHASE

Specify for product type, specification and units require.

Example of specification. Refer to page 1 for specification code.

	Type	Specification Code							
QLC - 110	L	B	3	3	1	1	1	1	0
	↑	↑	↑	↑	↑	↑	↑	↑	
No Backlight	Blank	Hard Model	Input Circuit	Input Range	Auxiliary Power	External Operation Input	Analog / Communication output	Pulse Output	
With Backlight	L								

* Change from initial setting can be receive with compensation. Please specify the items of change.
  Refer to page 14 and 15 for initialization value.
* Please have a consultation with us for specification which is not in specification code.

ELECTRONIC MULTI METER

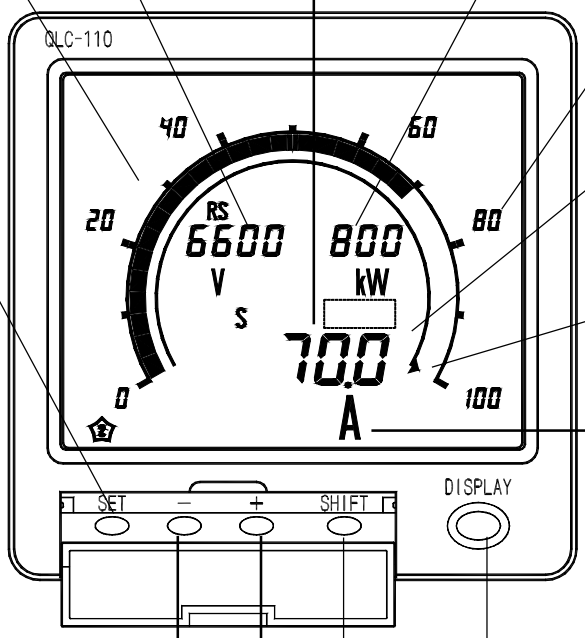
QLC-110/ QLC-110L

NAME AND THE FUNCTION OF EACH PART

Digital Display
3 elements can be measured and monitored concurrently.

Sub-monitor (L) **Main monitor** **Sub-monitor (R)**

Bar Graph Display
The measurement value of the main monitor is indicated by analog.
(Also the setting which measurement value of sub-monitor display by bar graph is possible.)



Scale Numbering
This is set automatically by measuring range setting.

Multiplying Factor Display
Watt hour and var hour display will be display at the upper right side of main monitor.

Flicker Setting Index
Can use it for a management index by flicker OFF setting.

Unit Display
This is set automatically by measuring range setting.

SET
This is a setting mode switch. With continual ON of 3 seconds or more, display mode become setting mode. This switch also used to determine setting value in the setting mode.

-
This switch used to confirm current flicker value, voltage flicker value, and power flicker value. Operation mode will returns back to display mode with non operation for 10 seconds. In setting mode, it is used to carry down the setting value.

+
This is the switch which changes the measuring elements of the main monitor. It can replace with the DISPLAY switch functionally by setting. In setting mode, it is used for carry up the setting value. It will returns back to original display pattern with non operation for 10 minutes.

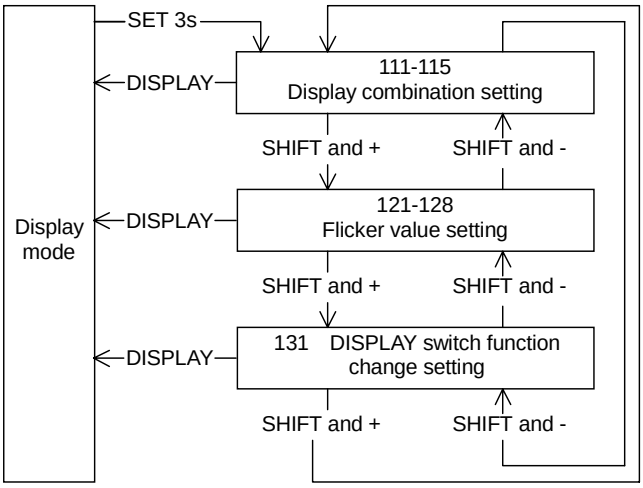
SHIFT
This switch used when expanding the integrated value Wh and varh. It can expand to 3 digit after decimal point.

DISPLAY
Used it when changing the switch current (voltage) phases (lines). Can replace with the + switch functionally by setting. Setting mode will returns back to display mode after 1 action. It will returns back to original set up display pattern with non operation for 10 minutes.

SETTING

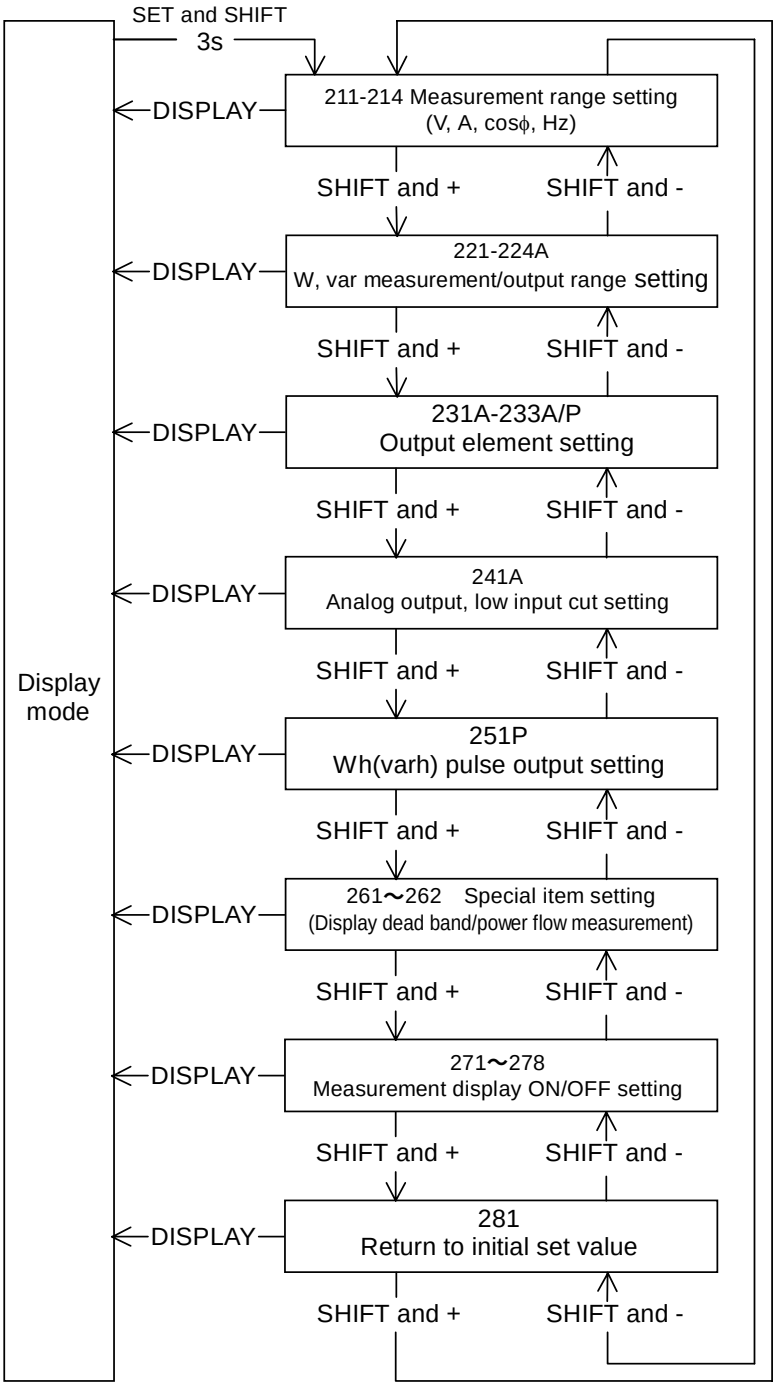
Refer to attached user's manual for setting method details.

Setting - 1



Refer to pg. 13 for display combination (pattern).

Setting - 2



ELECTRONIC MULTI METER

QLC-110/ QLC-110L

LC-110 SERIES COMMON SPECIFICATION

Approved Standard/ Pulse Output/ Intensity

Item		Electronic multi meter	Electronic harmonics meter relay	Electronic demand multi meter	Electronic max./ min. multi meter	Electronic overload/ leakage detection meter relay	Electronic three phase current meter	Electronic three phase voltage meter	Electronic DC receiving meter	Electronic DC input meter
Type	No backlight	QLC-110	HLC-110	DLC-110	MLC-110	LLC-110	ALC-110	VLC-110	XLC-110	TLC-110
	With backlight	QLC-110L	HLC-110L	DLC-110L	MLC-110L	LLC-110L	ALC-110L	VLC-110L	XLC-110L	TLC-110L
Approved standard		JIS C 1102 -1, -2, -3, -4, -5, -7 JIS C 1111 JIS C 1216 JIS C 1263 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed	JIS C 1102 -1, -2, -3, -5, -7 JIS C 1111 JIS C 1216 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7 JIS C 1111 JIS C 8325 JIS C 8374 JIS C 1216 Performance conformed	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed **Discontinued Model (since December 31,2011).**	JIS C 1102 -1, -2, -7 JIS C 1111 Performance conformed	JIS C 1102 -1, -2, -7, -9 JIS C 1111 JIS C 1010-1 Performance conformed EIA standard RS-485	JIS C 1102 -1, -2, -7, -8, -9 JIS C 1111 JIS C 1010-1 Performance conformed EIA standard RS-485
Pulse output	Output element	Watt-hour or var-hour	-	Watt-hour	-	Watt-hour	-	-	-	-
	Outout pulse constant	*Output system: Photo MOS - FET relay 1 a contact. Contact capacity: AC, DC125V 70mA (resistance load, inductive load) Output ON resistance: 10Ω or less.								
		*Pulse width: 250ms±10% (There is a case of 100-130ms by range setting.) When the output pulse cycle at the rated electric power becomes the speed of 2 pulses or more per second by setting voltage measurement range, current measurement range, and output pulse unit, the output pulse width becomes 100 - 130ms. *Output pulse cycle = Rated electric power [kW] / output pulse unit [kWh / pulse] / 3600 [sec.] For example: when voltage measurement range: 9000V (6600V / 110V), current range: 80.0A (80A / 5A), output pulse unit: 0.1 kWh / pulse rated electric power = 1kW × (6600 / 110V) × (80 / 5A) = 960 [kW] output pulse cycle = 960 [kW] / 0.1 [kWh / pulse] / 3600 [sec.] = 2.667 pulse / sec. pulse width becomes 100 - 130ms.								
		*Output pulse unit can be set in following range. Output pulse unit is not changed by changing measuring range.								
		Three phase 3 wire / Three phase 4 wire: Full load power (kW, kvar) = $\sqrt{3}$ × rated voltage (V) × rated current (A) × 10^{-3}								
		Single phase 3 wire : Full load power (kW, kvar) = 2 × rated voltage (V) × rated current (A) × 10^{-3}								
		Single phase : Full load power (kW, kvar) = Rated voltage (V) × rated current (A) × 10^{-3}								

Full load power (kW, kvar)		Output pulse unit kWh (kvarh) / pulse				Multiplying factor
Below1		0.1	0.01	0.001	0.0001	0.01 *(1)
1 or more	Below 10	1	0.1	0.01	0.001	0.1
10 or more	Below 100	10	1	0.1	0.01	1
100 or more	Below 1000	100	10	1	0.1	10
1,000 or more	Below 10,000	1,000	100	10	1	100
10,000 or more	Below 100,000	10,000	1,000	100	10	1,000
100,000 or more	Below 1,000,000	100,000	10,000	1,000	100	10,000

(1) Applied only for DLC-110 / 110L. Even though multiplying factor is 0.01, multiplying factor display is 0.1 (integer digit: 4 digits display Expansion display: 4 digits after decimal point.)

ELECTRONIC MULTI METER

QLC-110/ QLC-110L

LC-110 SERIES COMMON SPECIFICATION

Approved Standard/ Pulse Output/ Intensity

Strength	Overload capacity	(1) Voltage circuit: 2 times of rated voltage (10sec.) 1.2 times (continuity)
		(2) Current circuit: 40 times of rated current (1 sec.), 20 times (4 sec.), 10 times (16 sec.), 1.2 times (continuity)
		(3) Auxiliary power: 1.5 times of rated voltage (10 sec.), 1.2 times (continuity), 1.5 times of rated voltage at DC100/ 110 (10 sec.), 1.3 times (continuity)
		(4) DC input circuit (4 to 20mA): 10 times of rated current (5 sec.), 1.2 times (continuity)
	Insulation resistance	(1) Between electrical system and case (ground) DC500V 50MΩ or more
		(2) Between input, output and auxiliary power DC500V 50MΩ or more
		(3) Between analog output and pulse output DC500V 50MΩ or more (QLC, DLC, LLC)
		(4) Between analog output and alarm output DC500V 50MΩ or more (HLC, DLC, MLC, LLC)
		(5) Between communication output and pulse output DC500V 50MΩ or more (QLC, DLC)
		(6) Between communication output and alarm output DC500V 50MΩ or more (DLC,MLC)
		(7) Between pulse output and alarm output DC500V 50MΩ or more (DLC,LLC)
		(8) Between alarm output 1 and alarm output 2 DC500V 50MΩ or more (HLC,LLC)
		(9) Between DC input (4 to 20mA), AC input and auxiliary power DC500V 50MΩ or more (QLC with DC input)
		(10) Between DC inputs DC500V 50MΩ or more (XLC,TLC)
		(11) Non-insulation by minus common between analog outputs. (QLC, DLC, HLC, XLC, TLC, MLC)
	Withstand voltage	(1) Between electrical system and case (ground) AC2000V 50/ 60 Hz 1 min.
		(2) Between input, ouutput and auxiliary power AC2000V 50/ 60 Hz 1 min.
		(3) Between analog output and pulse output AC1500V 50/ 60 Hz 1 min. (QLC, DLC, LLC)
		(4) Between analog output and alarm output AC1500V 50/ 60 Hz 1 min. (HLC, DLC, MLC, LLC)
		(5) Between communication output and pulse output AC1500V 50/ 60 Hz 1 min. (QLC, DLC)
		(6) Between communication output and alarm output AC1500V 50/ 60 Hz 1 min. (DLC, MLC)
		(7) Between pulse output and alarm output AC1500V 50/ 60 Hz 1 min. (DLC, LLC)
		(8) Between alarm output 1 and alarm output 2 AC1500V 50/ 60 Hz 1 min. (HLC, LLC)
		(9) Between DC input (4 to 20mA), AC input and auxiliary power AC2000V 50/ 60 Hz 1 min. (QLC with DC input)
		(10) Between DC inputs AC2000V 50/ 60 Hz 1 min. (XLC, TLC)
		(11) Non-insulation by minus common between analog outputs. (QLC, DLC, HLC, XLC, TLC, MLC)
	Lightning impulse withstand voltage	(1) Between electrical system (analog output/ communication output excluded) and ground 6kV 1.2/ 50μs positive/ negative polarity 3 times for each (QLC, DLC)
		(2) Between electrical system (DC input 4 to 20mA excluded) and ground 5kV 1.2/ 50μs positive/ negative polarity 3 times for each
		(3) Between analog output or communication output and ground 5kV 1.2/ 50μs positive/ negative polarity 3 times for each (QLC,DLC)
		(4) Between auxiliary power and ground 7kV 1.2/ 50μs positive/ negative polarity 3 times for each (LLC)
	Noise capacity	(1) Oscillatory surge voltage 1 to 1.5MHz peak voltage: When attenuated oscillatory waveform (2.5 to 3kV) is applied repeatedly: Measured error: within 10% (power circuit, AC voltage circuit, AC current circuit, XLC, TLC: DC voltage/ current circuit) No communication error/ communication halt
		(2) Square-wave impulse noise Noise (1μS, 100ns width) is repeatedly applied for 5 min. : Measured error is within 10% AC voltage/ AC current circuit (normal/ common) 1.5 kV or more — Power circuit (normal/ common) 1.5 kV or more Pulse output (common) 1.0 kV or more — Alarm output (common) 1.0 kV or more Operation input (common) 1.0 kV or more — Analog output (Inductive) 1.0 kV or more Communication output (Inductive) 1.0kV or more
		(3) Radio noise: When radion wave (150, 400, 900MHz) is applied (5W, 1m) intermittently: Measured error is within 10%
		(4) Electrostatic noise: At the passage of electric current 8kV Measured error : within 10% At no passage of electric current 10kV: No damage (condenser charge system)
		Note: There are some cases that some item can not be applied for particular model. Refer to type and specification code.
	Vibration/ shock	Vibration: 1/ 2 peak-peak: 0.15mm 10 to 55Hz 1 octave/ min. 5 times sweep
		Shock: 490m/s² 3 times for each direction.

ELECTRONIC MULTI METER

QLC-110/ QLC-110L

DISPLAY COMBINATION (PATTERN)

1. Three phase 3 wire/ Three phase 4 wire (voltage/ current input)

No.	Pattern NO.	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Bar graph	Note
1	Pattern 1	A(S)	V(RS)	W	A(S)	Standard
2	Pattern 2	W	V(RS)	A(S)	W	
3	Pattern 3	Wh	V(RS)	A(S)	A(S)	
4	Pattern 4	Wh	A(S)	W	A(S)	
5	Pattern 5	Wh	A(S)	W	W	
6	Pattern 6	A(S)	V(RS)	Hz	A(S)	
7	Pattern 7	A(S)	V(RS)	-	A(S)	
8	Pattern 8	V(RS)	V(ST)	V(TR)	V(RS)	
9	Pattern 9	A(S)	A(R)	A(T)	A(S)	Specification
A	Pattern A	V(RS)	-	Hz	V(RS)	
B	Pattern B	cosΦ	A(S)	W	W	
C	Pattern C	cosΦ	V(RS)	Hz	cosΦ	
D	Pattern D	cosΦ	-	Hz	cosΦ	
E	Pattern E	var	A(S)	W	W	
F	Pattern F	Wh	W	cosΦ	W	
G	Pattern G	W	var	cosΦ	W	

2. Single phase 3 wire (voltage/ current input)

No.	Pattern NO.	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Bar graph	Note
1	Pattern 1	A(R)	V(RN)	W	A(R)	Standard
2	Pattern 2	W	V(RN)	A(R)	W	
3	Pattern 3	Wh	V(RN)	A(R)	A(R)	
4	Pattern 4	Wh	A(R)	W	A(R)	
5	Pattern 5	Wh	A(R)	W	W	
6	Pattern 6	A(R)	V(RN)	Hz	A(R)	
7	Pattern 7	A(R)	V(RN)	-	A(R)	
8	Pattern 8	V(RN)	V(TN)	V(RT)	V(RN)	
9	Pattern 9	A(R)	A(T)	A(N)	A(R)	Specification
A	Pattern A	V(RN)	-	Hz	V(RN)	
B	Pattern B	cosΦ	A(R)	W	W	
C	Pattern C	cosΦ	V(RN)	Hz	cosΦ	
D	Pattern D	cosΦ	-	Hz	cosΦ	
E	Pattern E	var	A(R)	W	W	
F	Pattern F	Wh	W	cosΦ	W	
G	Pattern G	W	var	cosΦ	W	

3. Single phase (voltage/ current input)

No.	Pattern NO.	Main monitor	Sub-monitor (L)	Sub-monitor (R)	Bar graph	Note
1	Pattern 1	A	V	W	A	Standard
2	Pattern 2	W	V	A	W	
3	Pattern 3	Wh	V	A	A	
4	Pattern 4	Wh	A	W	A	
5	Pattern 5	Wh	A	W	W	
6	Pattern 6	A	V	Hz	A	
7	Pattern 7	A	V	-	A	
8	Pattern 8	V	-	0	V	
9	Pattern 9	A	-	-	A	Specification
A	Pattern A	V	-	Hz	V	
B	Pattern B	cosΦ	A	W	W	
C	Pattern C	cosΦ	V	Hz	cosΦ	
D	Pattern D	cosΦ	-	Hz	cosΦ	
E	Pattern E	var	A	W	W	
F	Pattern F	Wh	W	cosΦ	W	
G	Pattern G	W	var	cosΦ	W	

Combination beyond above-mentioned pattern can be set with front switch.

Note: (1) Voltage input product: Only pattern 8 & A

(2) Current input product: Only pattern 9

ELECTRONIC MULTI METER

QLC-110/ QLC-110L

INITIALIZATION VALUE

1. Voltage/ Current Input

No.	Setting item			Three phase 3 wire		Three phase 4 wire		Single phase 3 wire	Single phase	
				110V input	220V input	110/ √3V input	220/ √3V input		110V input	220V input
1	Display combination	Pattern		Pattern 1		Pattern 1		Pattern 1	pattern 1	
		Main monitor		A(S)		A(S)		A(R)	A	
		Sub-monitor (L)		V(RS)		V(RS)		V(RN)	V	
		Sub-monitor (R)		W		W		W	W	
		Bar graph		A(S)		A(S)		A(R)	A	
2	Flicker	Current	Upper limit	100.0A (/5A)		1500A (/5A)		500A (/5A)	50.0A (/5A)	
			Flicker ON/ OFF	OFF		OFF		OFF	OFF	
		Voltage	Upper limit	7260V (/121V)	242V	440V (/110V)	220V	110.0V	3630V (/121V)	242V
			Lower limit	5940V (/99V)	198V	360V (/90V)	180V	90.0V	2970V (/99V)	198V
			Flicker ON/ OFF	OFF		OFF		OFF	OFF	
		Power	Upper limit	1200kW (/1kW)	40.0kW (/2kW)	1200kW (/1kW)	600kW (/2kW)	100kW (/1kW)	150kW (/500W)	10kW (/1kW)
			Lower limit	-180kW (/-150W)	-6.0kW (/-300W)	-180kW (/-150W)	-90kW (/-300W)	-15kW (/-150W)	-22.5kW (/-75W)	-1.5kW (/-150W)
			Flicker ON/ OFF	OFF		OFF		OFF	OFF	
3	Voltage range			9000V (6600V/110V)	300V (220V direct)	600V (440V/110V)	300V (220V direct)	150.0V (100-200V)	4500V (3300V/110V)	300V (220V direct)
4	Current range			100.0A (100A/5A)		1500A (1500A/5A)		500A (500A/5A)	50.0A (50A/5A)	
5	Power range			1200kW (/1kW)	40.0kW (/2kW)	1200kW (/1kW)	600kW (/2kW)	100.0kW (/1kW)	150.0kW (/500W)	10.00kW (/1kW)
6	Reactive power range			LEAD,LAG600kvar (/500var)	LEAD,LAG20.0kvar (/1kvar)	LEAD,LAG600kvar (/500var)	LEAD,LAG300kvar (/1kvar)	LEAD,LAG50.0kvar (/500var)	LEAD,LAG75.0kvar (/250var)	LEAD,LAG5.00kvar (/500var)
7	Power factor range			LEAD0.5 - 1 - LAG0.5		LEAD0.5 - 1 - LAG0.5		LEAD0.5 - 1 - LAG0.5	LEAD0.5 - 1 - LAG0.5	
8	Frequency range			45 - 65Hz		45 - 65Hz		45 - 65Hz	45 - 65Hz	
9	Output 1 element *1			Analog output: A(S)		Analog output: A(S)		Analog output: A(R)	Analog output: A	
10	Output 2 element *1			Analog output: V(RS)		Analog output: V(RS)		Analog output: V(RN)	Analog output: V	
11	Output 3 element *1	Analog output		W		W		W	W	
		Pulse output		Wh		Wh		Wh	Wh	
12	Power analog output range *1			1200kW (/1kW)	40.0kW (/2kW)	1200kW (/1kW)	600kW (/2kW)	100kW (/1kW)	150kW (/500W)	10.00kW (/1kW)
13	Reactive power analog output range *1			LEAD,LAG600kvar (/500var)	LEAD,LAG20.0kvar (/1kvar)	LEAD,LAG600kvar (/500var)	LEAD,LAG300kvar (/1kvar)	LEAD,LAG50.0kvar (/500var)	LEAD,LAG75.0kvar (/250var)	LEAD,LAG5.00kvar (/500var)
14	Output pulse unit *1			10kWh (kvarh)/ Pulse	0.1kWh (kvarh)/ pulse	10kWh (kvarh)/ pulse	1kWh (kvarh)/ pulse	1kWh (kvarh)/ pulse	1kWh (kvarh)/ pulse	0.1kWh (kvarh)/ pulse

In case of communication output specification: Setting items No.9 to No.14 is as below.

*1 Option selection.

No.	Setting item	Three phase 3 wire		Three phase 4 wire		Single phase 3 wire	Single phase	
		110V input	220V input	110/ √3V input	220/ √3V input		110V input	220V input
9	Address	1		1		1	1	
10	Transmission speed	9600bps		9600bps		9600bps	9600bps	
11	Data bits	7 bits		7 bits		7 bits	7 bits	
12	Parity	Even (E)		Even (E)		Even (E)	Even (E)	
13	Stop bit	1		1		1	1	
14	Pulse output element *1	Wh		Wh		Wh	Wh	
15	Checksum addition range	ETX included		ETX included		ETX included	ETX included	
16	Output pulse unit *1	10kWh (kvarh)/ pulse	0.1kWh (kvarh)/ pulse	10kWh (kvarh)/ pulse	1kWh (kvarh)/ pulse	1kWh (kvarh)/ pulse	1kWh (kvarh)/ pulse	0.1kWh (kvarh)/ pulse

*1 Option selection.

ELECTRONIC MULTI METER

QLC-110/ QLC-110L

INITIALIZATION VALUE

2. Current input

No.	Setting item			Three phase 3 wire	Three phase 4 wire	Single phase 3 wire	Single phase
1	Display combination	Pattern		Pattern9	Pattern9	Pattern9	Pattern9
		Main monitor		A(S)	A(S)	A(R)	A
		Sub-monitor (L)		A(R)	A(R)	A(T)	-
		Sub-monitor (R)		A(T)	A(T)	A(N)	-
		Bar graph		A(S)	A(S)	A(R)	A
2	Flicker	Current	Upper limit	100.0A (/5A)	1500A (/5A)	500A (/5A)	50.0A (/5A)
			Flicker ON/ OFF	OFF	OFF	OFF	OFF
3	Current range			100.0A (100A/5A)	1500A (1500A/5A)	500A (500A/5A)	50.0A (50A/5A)
4	Output 1 element *1			Analog output: A(S)	Analog output: A(S)	Analog output: A(R)	Analog output: A
5	Output 2 element *1			Analog output: A(R)	Analog output: A(R)	Analog output: A(T)	-
6	Output 3 element *1			Analog output: A(T)	Analog output: A(T)	Analog output: A(N)	-

In case of communication output specification: Setting items No.4 to No.5 is as below. *1 Option selection.

No.	Setting item	Three phase 3 wire	Three phase 4 wire	Single phase 3 wire	Single phase
4	Address	1	1	1	1
5	Transmission speed	9600bps	9600bps	9600bps	9600bps
6	Data bits	7 bits	7 bits	7 bits	7 bits
7	Parity	Even (E)	Even (E)	Even (E)	Even (E)
8	Stop bit	1	1	1	1
9	Checksum addition range	ETX included	ETX included	ETX included	ETX included

3. Voltage input

No.	Setting item			Three phase 3 wire		Three phase 4 wire		Single phase 3 wire	Single phase	
				110V input	220V input	110/ √3 input	220/ √3 input		110V input	220V input
1	Display combination	Pattern		Pattern8		Pattern8		Pattern8	Pattern8	
		Main monitor		V(RS)		V(RS)		V(RN)	V	
		Sub-monitor (L)		V(ST)		V(ST)		V(TN)	-	
		Sub-monitor (R)		V(TR)		V(TR)		V(RT)	-	
		Bar graph		V(RS)		V(RS)		V(RN)	V	
2	Flicker	Voltage	Upper limit	7260V (/121V)	242V	440V (/110V)	220V	110.0V	3630V (/121V)	242V
			Lower limit	5940V (/99V)	198V	360V (/90V)	180V	90.0V	2970V (/99V)	198V
			Flicker ON/ OFF	OFF		OFF		OFF	OFF	
3	Voltage range			9000V (6600V/ 110V)	300V (220V direct)	600V (440V/ 110V)	300V (220V direct)	150.0V (100 - 200V)	4500V (3300V/ 110V)	300V (220V direct)
4	Frequency range			45 - 65Hz		45 - 65Hz		45 - 65Hz	45 - 65Hz	
5	Output 1 element *1			Analog output: V(RS)		Analog output: V(RS)		Analog output: V(RN)	Analog output: V	
6	Output 2 element *1			Analog output: V(ST)		Analog output: V(ST)		Analog output: V(TN)	Analog output: Hz	
7	Output 3 element *1			Analog output: V(TR)		Analog output: V(TR)		Analog output: V(RT)	-	

In case of communication output specification: Setting items No.5 to No.7 is as below. *1 Option selection.

No.	Setting item	Three phase 3 wire		Three phase 4 wire		Single phase 3 wire	Single phase	
		110V input	220V input	110/ √3V input	220/ √3V input		110V input	220V input
5	Address	1		1		1	1	
6	Transmission speed	9600bps		9600bps		9600bps	9600bps	
7	Data bits	7 bits		7 bits		7 bits	7 bits	
8	Parity	Even (E)		Even (E)		Even (E)	Even (E)	
9	Stop bit	1		1		1	1	
10	Checksum addition range	ETX included		ETX included		ETX included	ETX included	